



Healthcare Analytics in Navy Medicine

Perspectives and Methods for Decision-Making

FOCUS ON MUSCULOSKELETAL CARE

Musculoskeletal Care in Military Medicine

Daniel V. Unger IV, MD, CAPT MC USN

Musculoskeletal (MSK) complaints and injuries are the primary issues affecting operational readiness of our Warrior Athletes. Whether it is from combat or non-battle injury, musculoskeletal issues are the most common reason active duty members seek medical care, and they account for the greatest volume of medical boards and medical discharges. It is critical that musculoskeletal care be optimized to maintain a capable fighting force and minimize operational personnel losses, all while maximizing the longevity and resiliency of our highly trained and experienced Warfighters.

A Team Sport

Musculoskeletal care involves numerous specialties that must work closely together in treating the scope of musculoskeletal issues. These specialties include orthopedics (with sub-specialties of trauma, spine, hand, pediatrics, foot and ankle, sports, total joint, and oncology), podiatry, chiropractic, physical medicine and rehabilitation (PM&R), physical therapy, occupational therapy, neurosurgery, family practice sports medicine, and athletic trainers. Many MSK patients sustain complex injuries involving other systems (e.g., TBI, PTSD, head and neck injury, and genitourinary injury) that complicate rehabilitation and require close coordination of care, especially in our Wounded Warriors. This multi-disciplinary approach to care provides for the optimal treatment and most expeditious rehabilitation and restoration to maximal function. The overarching goal is to have patients access the right level of care for their particular problem. Whether that be a non-sur-

gical issue treated by the Marine Sports Medicine and Reconditioning Team (SMART) or Navy Sports Medicine Clinic or a surgical condition treated by the orthopedics or neurosurgery department, each level involves multiple specialties working together to maximize care. The better coordinated the team with the right mix of players, the better the final outcome. The Navy's MCCAB (Musculoskeletal Continuum of Care Advisory Board) was created to promote this concept and aid in the coordination of the Navy's musculoskeletal assets to provide consistent, world class care throughout the enterprise and in theater.

Current MSK Initiatives

In Theater: The MCCAB's development of AFP (Adaptive Force Packaging) for musculoskeletal injuries in theater and during humanitarian assistance/disaster relief operations brought the concept of specific building blocks of MSK capabilities to match theater medical requirements. Musculoskeletal AFPs include:

1. Damage Control Orthopedics
2. Advanced Orthopedic Trauma
3. Definitive Orthopedic Trauma (used during host nation and disaster relief missions)
4. Force Sustainment (used at Concussion and Musculoskeletal Restoration Care Centers - CMRCC)
5. Definitive Orthopedic Care (used during humanitarian missions).

IN THIS ISSUE

Volume 2 • Issue 2

Focus on Musculoskeletal Care.....	1
Issue Brief – <i>The Volume and Quality Paradigm</i>	3
Skills and Methods – <i>Refining the Question</i>	5
Data and Information Systems – <i>Direct Care</i> <i>Ancillary Data in M2 and the MDR</i>	6
New Knowledge – <i>Data Note; Noted Publications</i>	8
Knowledge Sources	10

These packages match specific provider skill sets, ancillary support, and equipment to specifically address a particular requirement. Multiple requirements would require a mixture of the building blocks to meet the complete needs of that specific mission. For example, the Force Sustainment Package used at CMRCC was fielded in support of Marine operations at Camp Leatherneck almost two years ago as a proof of concept with tremendous success in treating both TBI and non-surgical MSK injuries in theater. This package requires a multi-disciplinary team of a family practice sports medicine physicians, physical therapists, occupational therapists, mental health providers, and Corpsman support.

Moreover, advances in musculoskeletal care during OIF/OEF that have produced life- and limb-saving results in theater include the use of point of injury tourniquets for hemorrhage control, acute damage control stabilization of injuries, rapid MEDEVAC through echelons of care for definitive treatment in CONUS facilities, and the utilization of negative pressure wound dressings in the management of devastating combat wounds. The advancement of orthopedic limb salvage and amputation techniques coupled with state-of-the-art multi-disciplinary rehabilitation protocols and advanced orthotics and prosthetics have also significantly improved function and quality of life after devastating theater injury.

Non-Theater: MCCAB's focus closer to home includes maximizing quality, efficiency, practice scope, patient safety, and the consistency of musculoskeletal care. The first endeavor is developing a standardized spine template, which incorporates the evaluation, diagnosis, and management of the "DoD/VA Low Back Clinical Practice Guideline." This is a multi-disciplinary effort of orthopedic spine surgeons, chiropractors, physical therapists, family practice physicians, and neurosurgeons to create a clinically relevant template which documents necessary and consistent clinical data and diagnoses and links them to recommended treatment algorithms. The addition of basic outcomes measures using data collected in the spine template will help evaluate burden of disease, effectiveness of treatment, and potential preventive measures. This project is working in collaboration with the AHLTA Tri-Service Work Flow Core template group. If it proves to be effective and user-friendly, additional areas can be developed to standardize clinically

relevant documentation and treatment options for other MSK disorders (e.g., knee and shoulder injury). Eventually the entire scope of musculoskeletal care could be captured in a clinically relevant format with consistent documentation enabling evidence-based medicine evaluation and advancing the care of our own patient population.

Joint Replacement: Many are aware that over the past several years there have been multiple orthopedic implant recalls for total joint replacement. The Navy performs approximately 750 total joint replacements a year, but tracking patients with total joint implants and their specific manufacture and model information is difficult and institution-dependent. The MCCAB engaged all Navy fellowship-trained joint reconstructive surgeons to create a total joint registry where all pertinent implant information is documented and easily retrievable. While standardized total joint data are now being collected at each NMC/MTF performing total joint replacements, we are in the process of creating a centralized, enterprise-wide total joint registry. This registry effort will initially improve safety issues, such as recalls, but, eventually, it will also provide long-term outcomes information for quality improvement. Future directions in high-cost implants in sub-specialties such as total joint and spine include consensus on practice parameters and standardized vendor agreements for volume pricing incentives. Leveraging our extensive knowledge base of experts within these numerous MSK sub-specialty fields to standardize clinical evaluation and treatment options will continue to advance the quality, consistency, and efficiency of musculoskeletal care throughout the Navy.

Research: Along with continuing to advance care through multi-discipline collaboration and integration, the Navy is intimately involved in clinically meaningful research relevant to the Warfighter population. This research is primarily directed toward MSK conditions resulting from combat trauma and non-battle injuries and their sequela. In addition to institution-specific research, the Navy has three of four military sites involved in multi-center research consortia addressing injuries sustained in battle. These consortia were established through the Congressionally Directed Military Research Program's funding of the Peer Review Orthopedic Research Program, which awarded two consortium

grants. The first is METRC (Military Extremity Trauma Research Consortium) which is researching advanced techniques in severe orthopedic trauma. The second is the BADER (Bridging Advanced Developments for Exceptional Rehabilitation) Consortium which focuses on rehabilitation and achieving maximum function.

Summary

Musculoskeletal care is a critical component of maintaining a capable fighting force. Maximizing this capability and its impact on operational readiness is a team effort which requires coordination and planning. The best example of this strategy in bringing a musculoskeletal team approach to operational effectiveness can be demonstrated by Naval Special Warfare and its impact on operator performance and longevity. The Navy is currently at the pinnacle in treating combat casualties in theater and providing reconstructive and rehabilitative care CONUS. Continuing this direction of multi-disciplinary, coordinated care with an emphasis on standardization, appropriate provider mix, clinically meaningful research, and evidence-based practice will continue to advance the effectiveness and function of our Warrior Athletes and Wounded Warriors.

CAPT Unger is currently the Chairman of the Musculoskeletal Continuum of Care Advisory Board for Navy Medicine.

ISSUE BRIEF

– THE VOLUME AND QUALITY PARADIGM

Ted Jaditz, Ph.D.

This note looks at direct care volume for hip and knee total joint replacements, revisions of hip or knee joint replacement, hip partial joint replacements, and hip resurfacings. The relationship between volume and quality is evaluated, and options for increasing procedure volumes at MHS facilities serving large Navy populations are discussed.

Hip and Knee Procedure Volume at Navy MTFs

In FY2010, hip replacements and related procedures were performed at nine MTFs in catchment areas and MSMAs where Navy operates a bedded facility. Knee replacements and related procedures were performed

at ten locations. NMC Portsmouth had the highest volume program, performing 107 hip replacements and 155 knee replacements. The lowest volume hip programs performed 9 procedures, and the lowest volume knee program performed 6 knee procedures.

Compared to civilian hospitals, MHS facilities operate at low volumes. State health agencies for Maine¹, Nevada², and Massachusetts³ have published hospital-level procedure volume data. In these states, the vast majority of patients receive their hip procedures in facilities that perform more than 100 procedures per year. Only NMC Portsmouth performs as many as 100 hip procedures per year. For knee procedures in these states, the majority of patients have their knee procedure done in a facility that performs over 200 similar procedures per year. Again, none of these MTFs perform 200 knee procedures per year.

The Relationship Between Volume and Quality

There is extensive literature on the relationship between surgical volume and patient outcomes for knee and hip surgery. The key early references for hip procedures are Katz *et al.*⁴ and Solomon *et al.*⁵, both of whom look at outcomes for Medicare patients undergoing primary total hip replacement. The key references for knee procedures are Katz⁶ and Bozic *et al.*⁷ Research suggests that the best outcomes occur in facilities where more than 100 hip replacements per year are performed and

1 Maine Health Data Organization web site. Last accessed Jun 24, 2011, at <http://gateway.maine.gov/mhdo2008Monahrq/home.html>.

2 Nevada Compare Care web site. Last accessed Jul 1, 2011, at <http://www.nevadacomparecare.net/monahrq/home.html>.

3 Commonwealth of Massachusetts, Office of Health and Human Services. Last accessed Jun 24, 2011, at http://www.mass.gov/?pageID=eohhs2termina1&L=7&L0=Home&L1=Consumer&L2=Physical+Health+and+Treatment&L3=Quality+and+Cost&L4=Data+and+Statistics&L5=Physicians&L6=Volume+by+Surgeon+and+Hospital&sid=Eeohhs2&b=terminalcontent&f=dhcfp_quality_cost_indicators_v_hiprepl&csid=Eeohhs2

4 Jeffrey N. Katz, Elena Losina, Jane Barrett, et al. "Association Between Hospital and Surgeon Procedure Volume and Outcomes of Total Hip Replacement in the United States Medicare Population." *The Journal of Bone and Joint Surgery* 83, 2001:1622-1629.

5 Solomon D. H., Losina E, Baron J., et al. Contribution of hospital characteristics to the volume-outcome relationship: Dislocation and infection following total hip replacement surgery. *Arthritis & Rheumatism* 46,9, 2002:2436-2444

6 Jeffrey N. Katz, MD, MS, et. al. "Association Between Hospital and Surgeon Procedure Volume and Outcomes of Total Knee Replacement." *The Journal of Bone and Joint Surgery* 86, 2004:1909-1916.

7 Bozic KJ, Maselli J, Pekow PS, Lindenauer PK, Vail TP, Auerbach AD. "The influence of procedure volumes and standardization of care on quality and efficiency in total joint replacement surgery." *J Bone Joint Surg Am* 92,16, 2010:2643-52.

with surgeons who perform at least 50 procedures per year. Poor outcomes are associated with facilities that perform fewer than 25 procedures per year and surgeons who perform fewer than 10 procedures per year. For knee procedures, outcomes are best at facilities where more than 200 knee replacements are performed per year.

There are studies that criticize these findings, and studies that support them. However, many states, insurance companies, and Federal agencies are taking actions to support and implement volume guidelines as measures of quality care. First, several states are publishing statistics on the volume of major joint replacements performed in state hospitals and encouraging patients to use this information as a quality indicator. Second, major insurance companies are using volume targets to identify high quality providers. The Blue Cross / Blue Shield “Distinction Centers” program includes volume target guidelines that were developed with input from the American Academy of Orthopedic Surgeons and the American Board of Orthopedic Surgeons.⁸ Aetna’s “Institutes of Quality” program requires providers to maintain targets for hospital volume and surgeon volume.⁹ Third, although there is debate about the volume targets for hip and knee procedures in particular, there is broad agreement that “...hospitals performing more of certain intensive, high-technology, or highly complex procedures may have better outcomes for those procedures.”¹⁰ Of the 32 Inpatient Quality Indicators published by AHRQ, six are simple tabulations of procedure volume.¹¹

If High Procedure Volume Is Important for Quality, How Do We Get There?

There are two routes to higher volume programs. One route is recapture: can more procedures be done in the MTFs by reducing the number of beneficiaries – particularly enrolled beneficiaries -- who have their procedures done in purchased care settings? Another route is system rationalization: can volume from multiple small facilities be consolidated into fewer high volume facilities? Achieving higher volume programs will likely involve both strategies.

To illustrate, consider the National Capitol Area MSMA. In FY2010, 49 knee procedures were performed at Andrews AFB, while the rest were performed at Walter Reed and Bethesda. These facilities are within an hour drive time of each other. Is there any compelling reason why these procedures should not be consolidated to a single site?

What are recapture opportunities in the NCA?

- Beneficiaries in the NCA in FY2010 received 745 purchased care knee procedures. However, about two thirds of these were to individuals who were Medicare eligible. TRICARE is second payer to Medicare, so these procedures cost the MHS very little and there is not a business case for their recapture.
- There are an additional 110 purchased care knee replacements to individuals eligible for care at the MTF (enrolled in TRICARE Standard or Extra). Many of these beneficiaries have other health insurance, and thus they have easy options for care outside of MHS. Recapture of this group will be difficult.
- Finally, there are about 130 purchased care knee replacements to enrolled beneficiaries (TRICARE Prime or Plus). The TRICARE benefit grants the MTF the “right of first refusal” on specialty care to the enrolled, so in principal these procedures can be recaptured with relatively little effort.

The route to a high volume program in the NCA is clear: consolidate all procedures to a single program, and recapture almost all of the enrolled purchased care procedure volume. Outside of the MSMAs, the choices will be more difficult. Does Navy want to continue to operate low volume programs, with their associated risk of lower quality of care?

8 Blue Cross and Blue Shield Association, “Blue Distinction Centers for Knee and Hip Replacement. Program Description.” November, 2010. Last accessed Jul 1, 2011, at <http://www.bcbs.com/innovations/bluedistinction/blue-distinction-centers-knee-hip-replacement/>.

9 “Aetna Institutes of Quality Orthopedic Care Facilities Program Requirements 2010 Designations.” Last accessed Jul 1, 2011, at http://www.aetna.com/provider/data/AIOQC_Orthopedic_Program_Requirements.pdf.

10 Department of Health and Human Services, Agency for Healthcare Research and Quality. “Guide to Inpatient Quality Indicators.” March, 2007

11 National Committee for Quality Assurance (NCQA). HEDIS® 2010: Healthcare Effectiveness Data & Information Set. Vol. 2, Technical Specifications. Washington (DC): National Committee for Quality Assurance (NCQA); 2009 July

SKILLS AND METHODS

– REFINING THE QUESTION

Analysts across the MHS are routinely asked to prepare reports and studies on musculoskeletal care. This article compares methods for extracting musculoskeletal data using available diagnosis, procedure, and prescription information.

Major Diagnostic Categories

The most common approach to finding records related to any type of care is to filter using the Major Diagnostic Categories (MDC). MDCs are a broad classification of diagnoses typically grouped by body system or etiology of disease, and this classification scheme can be found in direct and purchased care ambulatory and inpatient data files. MDC 8 is Diseases of the Musculoskeletal System and Connective Tissue. It is important to note, however, that the MDC is derived from the primary diagnosis code only. Records with indications of musculoskeletal care only in secondary diagnosis fields will not be captured using the MDC approach. Roughly 15 percent of persons whose diagnostic data has indications of musculoskeletal care are only identifiable using secondary diagnoses.* Moreover, the MDC classification scheme generally does not group V-codes, ICD-9-CM diagnosis codes that identify conditions other than a disease or injury and are used to report significant factors that may influence present or future care. For example, MDC 8 does include some codes dealing with prosthetic limbs, but does not include V-codes that identify amputees. The set of diagnoses that start with V49.6 and V49.7 can be used to identify individuals who have had upper limb and lower limb amputations.

Diagnosis Related Codes

For inpatient encounters, Medical Severity Diagnosis Related Codes (MS-DRGs) are used to categorize patients who have similar clinical characteristics and similar costs. MS-DRGs were designed for hospital payment purposes, and patient hospital encounters are assigned to a MS-DRG based on the diagnosis, surgical procedures performed, patient age, and other information. MS-DRGs related to musculoskeletal care are generally found in the MS-DRG range 453-566. MS-DRGs are

present in both direct care and purchased care inpatient encounter files. A complete listing of MS-DRGs valid during the fiscal year of the encounter can be found in the M2 data dictionary (http://www.tricare.mil/ocfo/bea/functional_specs.cfm).

Diagnostic Codes

Individual ICD-9-CM diagnosis codes can also be used to further isolate specific types of patients with musculoskeletal conditions. One helpful method for aggregating diagnosis codes into meaningful clinical categories is the Agency for Healthcare Research and Quality (AHRQ) Clinical Classification Software (CCS) tool (<http://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp>). AHRQ has aggregated diagnosis codes into categories that are more granular than the MDCs, but less daunting than the thousands of individual ICD-9-CM codes. Applying the CCS logic allows for segregation of individual ICD-9-CM diagnosis codes into more discrete diagnostic categories such as arthroscopy, hip replacement, spinal fusion, etc. All the diagnoses included in MDC 8 can be found in multiple CCS categories, from osteopathies, dorsopathies, arthropathies, and the like (CCS single-level diagnosis categories 201-212) to injuries like sprains, strains, and fractures (categories 225-238). The CCS categories are also generally more likely to include all relevant musculoskeletal V-codes (the amputee codes above are included in category 211). See the CCS User's Guide at <http://www.hcup-us.ahrq.gov/toolssoftware/ccs/CCSUsersGuide.pdf> for more information about individual diagnosis categories.

Procedure Codes

Another approach to isolating musculoskeletal care is to look at treatment data. There are many procedure codes that indicate musculoskeletal treatment, such as arthroscopy. The AHRQ CCS software referenced above also has a component which classifies procedure codes into meaningful categories related to musculoskeletal treatment. This is particularly useful because there is not another readily available grouping of procedure codes, and the CCS Categories can be used to easily compare groups of CPT codes (found in outpatient data) to groups of ICD-9-CM procedure codes (found in inpatient data). Procedures like treatments of fractures, arthroscopies, arthroplasties, and amputations are grouped in CCS

single-level procedure categories 142-164, and physical therapy is grouped in categories 212-215 (see the CCS User's Guide at <http://www.hcup-us.ahrq.gov/toolssoftware/ccs/CCSUsersGuide.pdf> for more information about individual procedure categories).

To get a complete view of beneficiaries with musculoskeletal care, it is often important to consider both the procedure codes and diagnosis codes. About half of the patients that have a diagnosis in musculoskeletal care do not have a procedure in musculoskeletal care in the same year.* It is possible that the musculoskeletal problems are simple enough to not require any procedure to be done. Similarly, about half of the patients that have a procedure in musculoskeletal care do not have a diagnosis in musculoskeletal care in the same year.* It is possible in these cases that the care is being provided for problems that may have occurred in previous years.

Prescriptions

It is difficult to find prescriptions related to musculoskeletal care, because the drugs that are used to treat musculoskeletal conditions (e.g., analgesics and anti-inflammatories) can be used for a variety of other reasons. However, it is possible, at least on the direct care side, to match prescriptions to the appointment in which they were prescribed. For example, a direct care appointment for MDC 8 might have records in PDTs linked to it. About 30 percent of these appointments can be linked to at least one prescription, and about 60 percent of people who had a direct care encounter with MDC 8 have prescriptions that can be linked in this way.*

Identifying patients with musculoskeletal care can be challenging, but there are many tools available to help analysts narrow down the data. Different analyses call for different methods, but some combination of the aforementioned skills will yield the most complete picture of musculoskeletal care in the MHS data.

** All data reported are for fiscal year 2011 and were obtained from files in the MHS Data Repository (MDR).*

DATA AND INFORMATION SYSTEMS

– DIRECT CARE ANCILLARY DATA IN M2 AND THE MDR

Detailed data on laboratory and radiology ancillary services ordered and performed in MTFs (direct care) are currently available in both the MHS Data Repository (MDR) and the MHS Mart (M2), for FY2005 forward. The data are structured differently in the two systems, with separate Laboratory and Radiology files in the M2 and one Ancillary file in the MDR. This article describes key data variables available in these files, important data caveats, and an example of using these files to query ancillary data related to an important musculoskeletal condition.

The use of medical imaging to diagnose and treat a disease is an important component of musculoskeletal care. In an MTF, these radiology services are typically ordered by the provider during the office visit, and later, obtained by the patient in a different clinic. All ancillary services – laboratory and radiology – ordered by a provider during an MTF encounter are available for analysis in the MDR and M2 ancillary files. It is important to note that if an ancillary service was not ordered by the provider, but instead, was performed during the office visit (e.g., an ultrasound performed during the office visit), these services will be captured on the direct care encounter record, not the ancillary record.

Key Data Variables

A “Record Type” variable is available in the MDR to allow users to differentiate between the two types of records—laboratory and radiology. The M2 includes detail and summary files, all located under the “Health Services” folder. The data are limited to records with a “requesting” MEPRS code starting with “B” (ambulatory), “C” (dental), “D” (ancillary), and “FC” (health care support). Records with MEPRS Code “A” (inpatient) are not available because the billing for inpatient ancillary services is already included in the DRG costs.

Each laboratory specimen or radiology exam is assigned a unique accession number. The laboratory and radiol-

ogy files may contain many records per accession number; for example, many laboratory tests may be done on one specimen, and each test would represent a record. Results, as recorded using diagnosis codes, are not currently available in these files.

The laboratory and radiology files include the following:

- Provider information—the DMISID performing the test, MEPRS code ordering the test
- Patient information, including person identifiers, beneficiary category, and other demographics
- Appointment information, including date, CPT
- Costs and workload
- Enrollment information and patient geography

There are two number of services fields available:

- “Number of Services of Record”
- “Number of Services”

The “Number of Services of Record” field is the number of times a procedure was performed *as recorded in CHCS*. CHCS automatically reports bilateral radiological procedures as being performed twice. To avoid double counting, users should report the “Number of Services” field, as it corrects the bilateral reporting problem. CPT Modifiers are also available in both the Laboratory and Radiology data; however, the “2nd Modifier” is typically only found on radiology records. The second modifier identifies bilateral procedures. The second modifier may not be used if the CPT code used already includes this distinction.

The ancillary data also includes a “Related Record Identifier” that allows users to link the laboratory test or radiology exam to the encounter during which the test/exam was ordered. The encounter identifier is the “Appointment Record ID” if the order originated from an ambulatory encounter or the “Inpatient Registry ID” if the patient was in the hospital at the time of the ambulatory encounter that generated the laboratory event.

Caveats

There are several caveats that users of ancillary data need to be made aware of.

- The ancillary data do not have diagnosis codes available. Users will need to use the related record identifier and grab the diagnosis codes from that record.
- The ancillary data do not provide a complete picture of ancillary workload—the CAPER also contains ancillary workload, so both sources should be checked.
- There are significant gaps in reporting, especially during the start-up year. There is no chance of recovering these data.

Examples

The following examples uses the Radiology file to pull all records for patients treated in a specific MTF for low back pain:

- In M2, users would build a query against the Radiology detail file, setting a condition on the “Related Record Identifier”. The list of related record IDs would be generated from a sub-query against the CAPER, with the only results object being the Record ID. The conditions of the sub-query would include “Treatment DMIS ID” and “Diagnosis Codes” (Refer to Volume 1, Issue 1 for sub-query instructions).
- In the MDR, users would first write a program that pulls records for beneficiaries treated in your MTF for low back pain. You would then use this list of “Appointment IDs” to merge against the Ancillary table, taking caution to limit the ancillary data to “Record Type”=R.

NEW KNOWLEDGE

– DATA NOTE ON HIP AND KNEE REPLACEMENTS

The data note below presents FY2010 data on population rates of hip and knee joint replacements and related procedures at Navy MTFs. Surgery rates vary across regions served by Navy MTFs, and these differences have a big impact on healthcare spending.

In this note, data are presented on hip and knee total joint replacement, revision of hip or knee joint replacement, hip partial joint replacement, and hip resurfacing. The median age of patients receiving a knee procedure is 68, and the median age of patients receiving a hip procedure is 66 for males and 71 for females.

In FY2010, the population served by Navy MTFs received about 3,700 knee procedures and about 2,200 hip procedures, or about 2.3 knee procedures and 1.4 hip procedures per thousand beneficiaries. About 85 percent of these procedures were performed in purchased care settings and 15 percent in direct care.

Figure 1 displays how procedure rates vary across regions. Rates are standardized to a population with demographics and enrollment status corresponding to overall beneficiary population averages. The standardization adjustment is a statistical procedure that results in an estimate of what the local surgery rate would be if the local population had demographics similar to the overall population. Error bars are included to reflect the precision of the estimates.

The population in the San Diego MSMA has the lowest rate of knee procedures, about 1.85 per thousand beneficiaries. The rate in the Tidewater MSMA is 54 percent higher, the rate in the NH Camp Lejeune catchment area is 86 percent higher, and the overall population average is 26 percent higher than the rate in the San Diego MSMA.

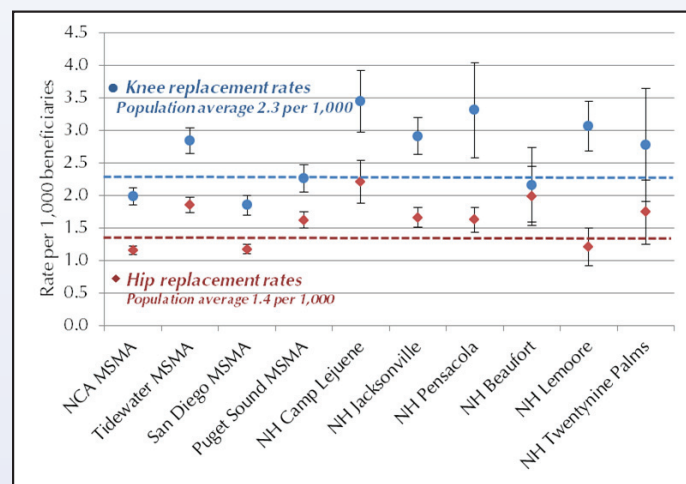
It is not clear why this variation exists. Are patients in other areas sicker? While the knee osteoarthritis rate is higher in the Tidewater MSMA than in San Diego, it is

only 15 percent higher. Differences in the rate of knee arthritis do not fully explain the difference in knee replacement rates.

The San Diego MSMA also has the lowest rate of hip procedures, about 1.17 per thousand beneficiaries. Compared to San Diego, the overall population average rate is 20 percent higher, the rate in the Tidewater MSMA is 58 percent higher, the rate in the NH Beaufort catchment area is 70 percent higher, and the rate in the NH Camp Lejeune catchment area is 89 percent higher. Again, there are differences in hip arthritis rates across these regions, but the differences are far too small to fully explain the differences in procedure rates.

Purchased care costs for these procedures vary by region, but in the civilian sector, the total charge for the surgeon, anesthesiologist, and the hospital stay for a hip or knee replacement is roughly \$20,000. If the knee procedure rate for the entire population was as low as the rate in the San Diego MSMA, there would have been about 783 fewer knee procedures. At \$20,000 per procedure, that implies a reduction in expenditure of \$15.6 million. Conversely, if the entire population matched the rate in the Tidewater MSMA, the number of knee procedures would increase by about 765 and total spending would increase by \$15.3 million.

Figure 1. Regional variation in knee and hip procedure rates, FY 2010



- NOTED PUBLICATIONS

The publication below provides statistics on the demographics and frequency of back problems, listed as a principal and secondary diagnosis, treated during emergency department (ED) visits and inpatient hospital stays.

Emergency department visits related to back problems, 2008.

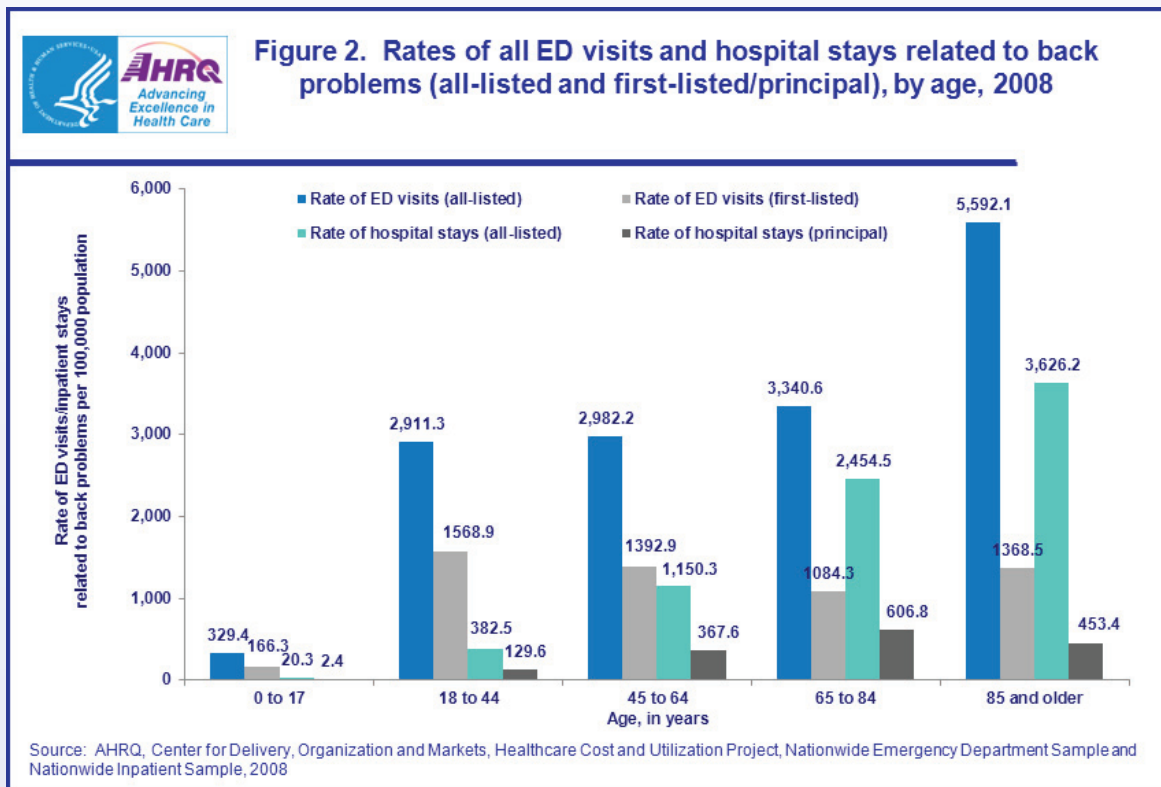
Owens, P, Woeltje M, Mutter R.
HUCP Statistical Brief #105. February 2011. Agency for Healthcare Research and Quality, Rockville, MD.

Researchers from the Agency for Healthcare Research and Quality (AHRQ) found that in 2008 almost 7.3 million ED visits and over 2.3 million hospital inpatient stays in the United States were related to back problems, largely defined as spondylosis, intervertebral disc disorders and other back pain. While it is expected that the rate of ED visits and inpatient stays with any diagnosis of back problems (i.e., back problem was the principal or secondary diagnosis) would increase with age, the

findings showed that the rate of ED visits with a principal/first-listed diagnosis of back problems was highest for 18 to 44 year olds, the predominant age group of the active duty military population. The figure below shows that the rate of ED visits for patients with a principal diagnosis of back problems was 1,569 ED visits per 100,000 population among 18 to 44 year olds – higher than any other age group.

Among all age groups, only 3.9 percent of ED visits principally for back problems were admitted to the hospital. However, this analysis found that the aggregate costs of inpatient stays principally related to back problems accounted for \$9.5 billion in 2008, accounting for almost three percent of the national hospital bill and making it the ninth most expensive condition treated in U.S. hospitals.

The estimates in this publication are based upon data from AHRQ's Healthcare Cost and Utilization Project (HCUP) 2008 Nationwide Inpatient Sample (NIS) and the 2008 Nationwide Emergency Department Sample (NEDS). Read more about this publication at <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb105.pdf>.



KNOWLEDGE SOURCES

Below are upcoming conferences for professional growth and development.

Related to this issue's theme –

June 27-30, 2012: The American Orthopaedic Association (AOA) Annual Meeting – Washington, DC
<http://www.aoassn.org/meetings-events/aoa-annual-meeting.aspx>

May 9-12, 2012: Society for Academic Emergency Medicine 2012 Annual Meeting – Chicago, IL
<http://am2012.saem.org/>

June 2-6, 2012: International Society for Pharmacoeconomics and Outcomes Research 17th Annual International Meeting – Washington, DC
<http://www.ispor.org/>

June 3-7, 2012: The Council of State and Territorial Epidemiologists 2012 Annual Conference – Omaha, NE
<http://www.csteconference.org/>

June 4-6, 2012: Navy Financial Audit Readiness Training Symposium – The National Conference Center, Lansdowne, VA

June 24-26, 2012: AcademyHealth Annual Research Meeting – Orlando, FL
<http://www.academyhealth.org/Events>

June 26-28, 2012: NATO Conference on Health Surveillance in Modern Military Medicine – Munich, DE
<http://events.bsbb.de/event/healthsurveillance/Home.html>

October 14-17, 2012: INFORMS 2012 Annual Meeting – Phoenix, AZ
<http://meetings2.informs.org/phoenix2012/>

October 27-31, 2012: American Public Health Association Annual Meeting and Exposition – San Francisco, CA
<http://www.apha.org/meetings/AnnualMeeting/>

IN THE NEXT ISSUE...

The next issue of *Healthcare Analytics in Navy Medicine* will focus on medical management in Navy Medicine. Medical management includes the practices of utilization management, case management, and disease management. Together, these activities target the goals of improving access and quality, managing cost, and optimizing readiness. The next issue will highlight current policy and practice issues related to medical management and feature skills and tools available to analysts to address these issues.

Editor:

Robert D. Willis

Managing Editor:

C. Allison Russo
John Montgomery, Ph.D.

Presentation Designer:

Liz Ritter

Contributors:

Veronika Badurova, Keith Hofmann,
Laura Hopkins, Ted Jaditz,
Allison Russo, and CAPT Daniel Unger

**Deputy Chief for Resource
Management/Comptroller,
Bureau of Medicine and Surgery**
Joseph B. Marshall, Jr.

This newsletter is produced and distributed by the Program Analysis and Evaluation Division, Bureau of Medicine and Surgery under delivery order # N00189-10-F-Z442.